

REQUEST FOR RECONSIDERATION

Claims 1 to 4, 6 to 13, 17, 18, and 20 to 24 as presented with applicants' paper dated June 22, 2007, are currently pending in this case.

The Examiner rejected Claims 18 and 20 under 35 U.S.C. §112, ¶1, as failing to comply with the written description requirement. More specifically, the Examiner asserted that the provision of Claim 18:

*providing the contaminated ionic liquid by*

- (a) separating volatile components from a mixture comprising the ionic liquid, the volatile components and the at least one impurity, by means of evaporation or rectification, and/or*
- (b) separating non-polar components from a mixture comprising the ionic liquid, the non-polar components and the at least one impurity, by means of extraction with a non-polar organic solvent,*

lacked adequate support in the application and that the provision therefore introduced new matter.<sup>1)</sup>

As already noted by applicants in their previous reply,<sup>2)</sup> the measures in accordance with subsection (a) of the provision in question are addressed on page 16, indicated lines 11 to 15, of the application, and the measures in accordance with subsection (b) of the provision are addressed on page 16, indicated lines 23 to 35, of the application. The Examiner argued that the referenced sections were insufficient as support because the statements made in that context pertained primarily to problems encountered in prior art processes.<sup>3)</sup> It should be appreciated, however, that applicants' point out that the process in accordance with their invention is sought to remedy the problems encountered in the prior art.<sup>4)</sup>

Moreover, applicants describe in Example 1 a procedure in which a contaminated ionic liquid was pretreated in the manner described in subsection (a) of the provision cited above.<sup>5)</sup> Additionally, applicants describe a Comparative example in which a solution of the contaminated ionic liquid of Example 1 was subjected to an extraction according to subsection (b) of the provision

1) Final Office action page 2, lines 1 to 7.

2) Applicants' papers dated January 08, 2008, and June 22, 2007, which are herewith incorporated by reference.

3) Final Office action page 16, lines 11 to 15.

4) Page 12, indicated lines 1 to 8, of the application.

5) Page 14, indicated lines 15 to 24, of the application.

cited above.<sup>6)</sup> The description of the respective investigations clearly supports that applicants' were in possession of the process comprising a stage in which a contaminated ionic liquid was provided by means of

- (a) separating volatile components from a mixture comprising the ionic liquid, the volatile components and the at least one impurity, by means of evaporation or rectification, and/or
- (b) separating non-polar components from a mixture comprising the ionic liquid, the non-polar components and the at least one impurity, by means of extraction with a non-polar organic solvent.

The test for determining compliance with the written description requirement is whether the disclosure of the application as originally filed reasonably conveys to a person of ordinary skill in the pertinent art that the inventor had at that time possession of the later claimed subject matter, and not the presence or absence of literal support in the specification for the claim language.<sup>7)</sup> There is no *haec verba* requirement, and newly added claim limitations may be supported in the specification through express, implicit or inherent disclosure.

It is respectfully urged that the means for providing the contaminated ionic liquid which are set forth in Claim 18, as well as the combination thereof in the context of the process defined in the claim, are supported in the specification through express, implicit or inherent disclosure in the application. It is therefore respectfully requested that the rejection of Claims 18 and 20 under Section 112, ¶1, be withdrawn. Favorable action is solicited.

The Examiner rejected Claims 1 to 4, 6 to 13, 17, 18 and 20 to 24 under 35 U.S.C. §112, ¶2, as being indefinite.

The purpose of the claim is not to explain the technology or how it works, but to state the legal boundaries of the patent grant, i.e. a claim is not "indefinite" simply because it is hard to understand without benefit of the specification,<sup>8)</sup> or the knowledge of a person of ordinary skill in the pertinent art. The test of definiteness is, accordingly, whether a person of ordinary skill in the art would understand the bounds of the claim when reading it in the light of the supporting

6) Page 15, indicated lines 15 to 22, of the application.

7) *In re Kaslow*, 707 F.2d 1366, 217 USPQ 1089 (Fed. Cir. 1983); *In re Edwards*, 568 F.2d 1349, 196 USPQ 465 (CCPA 1978); *In re Herschler*, 591 F.2d 692, 200 USPQ 711 (CCPA 1979). See also *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 19 USPQ 1111 (Fed. Cir. 1991).

8) *S3 Inc. v. nVIDIA Corp.*, 259 F.3d 1364, 59 USPQ2d 1745 (Fed. Cir. 2001); cf. also *Autogiro Co. of America v. United States*, 384 F.2d 391, 397, 155 USPQ 697, 701 (C. Cl. 1967) (a claim cannot be interpreted without going beyond the claim itself).

specification,<sup>9)</sup> and claims may use language that those skilled in the art understand without the need for explicit, detailed definitions in the written description.<sup>10)</sup> It is not necessary to define an invention with mathematical precision in order to comply with the definiteness requirement<sup>11)</sup> as claims need only *reasonably apprise those skilled in the art* as to their scope and be as precise as the subject matter permits.<sup>12)</sup> In particular, it is not required to claim each part of an invention with the same amount of detail; indeed, the Court of Appeals has acknowledged that such a rule likely would prove unworkable.<sup>13)</sup>

The Examiner argued that:<sup>14)</sup> *“The metes and bounds of ‘a substance having a vapor pressure in the mixture that prohibits complete removal of the substance from the mixture by distillation’ and ‘a substance that interacts with the at least one ionic liquid so as to prohibit complete removal of the substance from the mixture by distillation’ can not be determined.”* However, in reviewing a claim for compliance with the provisions of Section 112, ¶2, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope. It is deemed to be immediately apparent to a person having ordinary skill in the art, in particular in light of applicants’ representative examples, that applicants’ invention provides for a purification of a contaminated ionic liquid from impurities where the purification of the ionic liquid via a distillation is not feasible due to technical or economical constraints.<sup>15)</sup> Also, the Examiner’s position:<sup>16)</sup> *“what can and can not be distilled would appear to be a function of the skill of the distiller and would change over time”* is deemed to be without reasonable basis because numerous substances cannot be distilled, and numerous mixtures cannot be separated by distillation.

9) Cf. *Morton Int. Inc. v. Cardinal Chem. Co.*, 5 F.3d 1464, 28 USPQ2d 1190 (Fed. Cir. 1993); *Orthokinetics Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1 USPQ2d 1081 (Fed. Cir. 1986).

10) *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1556-1558, 220 USPQ 303, 315-16 (Fed. Cir. 1983).

11) *In re Marosi*, 710 F.2d 799, 802-03, 218 USPQ 292 (Fed. Cir. 1983); see also *Modine Mfg Co. v. U.S. Int’l Trade Comm’n*, 75 F3d 1545, 1557, 37 USPQ2d 1609, 1617 (Fed. Cir. 1996), cert. denied, 518 U.S. 1005 (1996).

12) *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ 634 (Fed. Cir. 1985), cert. denied, 480 U.S. 947 (1987).

13) *Resonate Inc. v. Alteon Websystems, Inc.*, 338 F.3d 1360, 67 USPQ2d 1771 (Fed. Cir. 2003).

14) Final Office action page 2, lines 10 to 14.

15) Cf. also applicants’ explanations on page 11, indicated lines 1 to 8, and on page 11, indicated line 14, to page 12, indicated line 8, of the application.

16) Final Office action page 2, lines 16 to 18, and page 16, line 22, to page 17, line 4.

The Examiner also argued that:<sup>17)</sup> “*Claim 24’s ‘no measurable vapor pressure’ is considered to be indefinite because what can and can not be measured would appear to be a function of the skill of the measurer, his tools, and would change over time*” is, for the same reasons, deemed to be without merits because it is based on the erroneous assumption that all substances have a vapor pressure at room temperature in mixture with an ionic liquid.

*In rejecting a claim under the second paragraph of 35 U.S.C. 112, it is incumbent on the examiner to establish that one of ordinary skill in the pertinent art, when reading the claims in light of the supporting specification, would not have been able to ascertain with reasonable degree of precision and particularity the particular area set out and circumscribed by the claims.*<sup>18)</sup>

The Examiner’s remarks can clearly not be deemed to establish that a person of ordinary skill in the pertinent art would not have been able to ascertain the metes and bounds of applicants’ claims with a reasonable degree of precision and particularity. It is therefore respectfully requested that the rejection of Claims 1 to 4, 6 to 13, 17, 18 and 20 to 24 under Section 112, ¶2, be withdrawn. Favorable action is solicited.

The Examiner rejected Claims 1 to 3, 8 to 11, 13, 17, 18 and 20 to 24 under 45 U.S.C. §102(b) as being anticipated by, or under 35 U.S.C. §103(a) as being unpatentable in light of, the teaching of *Earle et al.* (US 2004/0015009).

It is respectfully urged that anticipation under Section 102 can be found only if a reference shows exactly what is claimed, i.e. all material elements of the invention as claimed must be found in one prior art source,<sup>19)</sup> the elements must be shown in the reference in as much detail as is contained in the claim,<sup>20)</sup> and the elements must be shown in the reference in the part-to-part relationship which is set forth in the claim.<sup>21)</sup> The disclosure of the elements may be express, implicit or inherent.<sup>22)</sup> However, the fact that a certain result or characteristic may occur or be present

17) Final Office action page 2, lines 19 to 21.

18) *Ex parte Wu*, 10 USPQ2d 2031 at 2033 (BPAI 1989).

19) Cf. *In re Marshall*, 577 F.2d 301, 198 USPQ 344 (CCPA 1978); *In re Kalm*, 378 F.2d 959, 154 USPQ 10 (CCPA 1967).

20) Cf. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989).

21) Cf. *Lindemann Maschinenfabrik v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

22) *In re Napier*, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995). See also *In re Grasselli*, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983).

in the prior art is not sufficient to establish the inherency of that result or characteristic.<sup>23)</sup>

The teaching of *Earle et al.* cannot be deemed to provide a description of the subject matter defined in applicants' claims which meets these standards which were developed by the Courts for anticipation under Section 102.

Applicants' invention relates to a process for the purification of ionic liquids which are contaminated by at least one impurity, and applicants' process comprises removing the at least one impurity from the ionic liquids by adsorptive separation.

The teaching of *Earle et al.* pertains to a process for the oxidation of alkyl-aromatic compounds which is conducted in the presence of an ionic liquid and an acid promoter as catalyst. The reference addresses, on the one hand, means for separating the oxidation product and the ionic liquid,<sup>24)</sup> and on the other hand, means for separating the product and the ionic liquid/acid promoter combination.<sup>25)</sup> Additionally, the authors mention that the ionic liquid/acid promoter combination may be re-oxidized and recycled for use in further reactions.<sup>26)</sup>

It is respectfully urged that the statements regarding the separation of the product and the ionic liquid, or the product and the ionic liquid/acid promoter combination, cannot reasonably be deemed to pertain to the separation of an ionic liquid and at least one impurity. It is for the purposes of *Earle et al.*'s process clearly without consequence whether the ionic liquid/acidic promoter fraction which is recycled after the respective separation comprises residual product. In fact, when the ionic liquid or the ionic liquid/acid promoter combination is recycled as discussed in the reference, any residual amounts of the product, or for that matter any starting materials which may be present, are made available again. Also, neither the product, nor any starting material or acid promoter, can be deemed to impede the oxidation process of *Earle et al.* As such, neither the product, nor any starting materials or acid promoter, can reasonably be deemed to accumulate in the ionic liquid so as to render the ionic liquid unsuitable for recycling. Accordingly, any such materials cannot be regarded as impurities. The sections of the teaching of *Earle et al.* which enumerate means for the separation of the product and the ionic liquid, or for the separation of the product and the ionic liquid/acid promoter combination, can therefore not be deemed to identically describe the purifica-

23) *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981).

24) Cf. page 1, para. [0008], of US 2004/0015009.

25) Cf. page 3, para. [0043], of US 2004/0015009.

26) Cf. page 3, para. [0042], of US 2004/0015009.

tion of an ionic liquid which is contaminated with at least one impurity which is claimed by applicants.

The only substances encountered in the process of *Earle et al.* which might possibly be deemed to correspond to “impurities” referenced in applicants’ claims are the by-products which are mentioned in the description of the illustrative examples of the reference.<sup>27)</sup> However, these by-products are, according to the reference, removed by way of a distillation. The illustrative examples of *Earle et al.* can, therefore, also not be deemed to identically describe applicants’ process.

The separation procedures which are generally mentioned or specifically illustrated in the reference clearly fail to identically describe, explicitly or inherently, a process in which at least one impurity is removed from a contaminated ionic liquid by way of adsorptive separation, and the teaching of *Earle et al.* cannot be deemed to anticipate applicants’ process within the meaning of Section 102. Favorable reconsideration of the Examiner’s position and withdrawal of the respective rejection is respectfully solicited.

The teaching of *Earle et al.* is also not deemed to be sufficient to render applicants’ purification process *prima facie* obvious within the meaning of Section 103(a).

The United States Supreme Court recently reiterated: “*Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.*”<sup>28)</sup> While noting that the analysis under 35 U.S.C. §103 “*need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.*”<sup>29)</sup> the Court cautioned, however, that “*rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some*

27) Cf. page 2, para. [0023], to page 3, para. [0037], of **US 2004/0015009**.

28) *Graham v. John Deere*, 383 U.S. 1, at 17 – 18, 148 USPQ 459 (1966). Cf. *KSR Int’l v. Teleflex, Inc.*, 550 U.S. \_\_\_\_ (2007), Slip op. at 2.

29) *KSR Int’l v. Teleflex Inc.*, 127 S.Ct. 1727, \_\_\_, 82 USPQ2d 1385, 1397 (2007).

*rational underpinning to support the legal conclusion of obviousness.*<sup>30)</sup> The Court also emphasized the need “*to determine whether there was an apparent reason to combine known elements in the fashion claimed by the patent at issue.*<sup>31)</sup> To establish a *prima facie* case of obviousness it is, therefore, essential that there be some motivation or suggestion to make the claimed invention in light of the prior art teachings.<sup>32)</sup> “[A] proper analysis under §103 requires, *inter alia*, consideration of ... whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process.”<sup>33)</sup>

The Examiner took the position:<sup>34)</sup> “*if a difference exists between the claims and Earle (...), it would reside in optimizing the elements of Earle (...). It would have been obvious to optimize the elements of Earle (...) to enhance separation.*”

However, a particular parameter must first be recognized as a result effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.<sup>35)</sup> The ability to arrive at claimed subject matter through experimentation does not render a claim obvious when the experimentation and result are not suggested by the teachings in the art.<sup>36)</sup>

As noted above, the information which is provided in the reference and upon which the Examiner relies concerns the separation of the product and the ionic liquid, or the product and the ionic liquid/acid promoter combination. The product does not qualify as an impurity, and an optimization to enhance the respective separations can, therefore, not yield in applicants’ process. Additionally, the by-products which are mentioned by *Earle et al.* can also not be deemed to qualify as impurities because they are removed by distillation. An optimization of the respective separation is, therefore, superfluous.

In light of the foregoing reasons, the teaching of *Earle et al.* cannot be deemed to render

30) *KSR Int'l v. Teleflex, Inc.*, 127 S.Ct. at \_\_\_, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

31) *KSR Int'l v. Teleflex, Inc.*, 550 U.S. \_\_\_ (2007), Slip op. at 14.

32) See, e.g., *In re Brouwer*, 77 F.3d 422, 425, 37 USPQ2d 1663, 1666 (Fed. Cir. 1996) (“[T]he mere possibility that one of the esters or the active methylene group-containing compounds . . . could be modified or replaced such that its use would lead to the specific sulfoalkylated resin recited in claim 8 does not make the process recited in claim 8 obvious “unless the prior art suggested the desirability of [such a] modification” or replacement.”) (quoting *In re Gordon*, 733 F.2d 902, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)).

33) *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

34) Final Office action page 3, lines 22 to 26.

35) *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

36) *In re Waymouth*, 499 F.2d 1273, 182 USPQ 290 (CCPA 1974).

applicants' process obvious within the meaning of Section 103(a). Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is respectfully solicited.

The Examiner rejected Claims 1 to 3, 8 to 11, 13, 17, 18 and 20 to 24 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Earle et al.* (*ibid.*) when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* (US 5,543,474) or the disclosure of *Thiem et al.* (US 4,751,291), pointing out that one of the by-products encountered in the illustrative examples described by *Earle et al.*, namely nitrotoluene, was a high boiling polar compound.<sup>37)</sup>

However, as noted above, the by-products which are mentioned by *Earle et al.* cannot be deemed to qualify as impurities because they are removed by distillation. As such, the teaching of *Earle et al.* when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* or the disclosure of *Thiem et al.* can also not be deemed to render applicants' process obvious within the meaning of Section 103(a). Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is therefore respectfully solicited.

Further, the Examiner rejected Claims 2, 6, 7, 9, 12, 18 and 20 to 24 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Earle et al.* (*ibid.*) when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* (*ibid.*) or the disclosure of *Thiem et al.* (*ibid.*), when further taken in view of the disclosure of *Snyder* (*Introduction to Modern Liquid Chromatography*).

The Examiner applied the disclosure of *Snyder* for stating that ion exchange was the first of various liquid chromatography methods to be used widely under modern conditions, and for disclosing that reversed phase silica gel packings are the closest to a universal system for modern liquid chromatography and that water is usually used as a base solvent,<sup>38)</sup> and argued that a person of ordinary skill in the art would therefore have been motivated to employ ion exchange, with water as a solvent, and reverse phase silica gel in the separation conducted in the procedure of *Earle et al.*<sup>39)</sup>

37) Final Office action page 4, lines 6 to 17.

38) Final Office action page 5, lines 6 to 9, and page 8, lines 3 to 7.

39) Final Office action page 5, lines 9 to 10, and page 8, lines 7 to 14.

Again, the Examiner's argument is deemed to be in error because the by-products which are mentioned by *Earle et al.* cannot reasonably be considered to qualify as impurities because they are removed by distillation. As such, the teaching of *Earle et al.* when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* or the disclosure of *Thiem et al.*, when further taken in view of the disclosure of *Snyder*, can also not be deemed to render applicants' process obvious within the meaning of Section 103(a). Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is therefore respectfully solicited.

The Examiner rejected Claims 18 and 20 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Earle et al.* (*ibid.*) when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* (*ibid.*) or the disclosure of *Thiem et al.* (*ibid.*), and the disclosure of *Snyder* (*ibid.*), when further taken in view of the disclosure of *Mikes et al.* (*Laboratory Handbook of Chromatographic and Allied Methods*, John Wiley Sons, New York 1979, pages 218-219, "Ion Exchange Chromatography").

The Examiner argued:<sup>40)</sup> "*It would have been obvious that Earle (...) alone or further in view of Hackh's Chemical Dictionary, ..., either Kawaki (...) or Thiem (...), and Snyder ... uses a resin because Mikes' [sic] Laboratory Handbook ... discloses that synthetic resins are of the greatest importance for ion exchange chromatography.*" However, as noted in the foregoing, the product obtained in *Earle et al.*'s process cannot be deemed as an impurity because it cannot reasonably be expected to accumulate in the ionic liquid, and/or to impede the oxidation reaction. The by-products which are formed in the context of the oxidation reaction of *Earle et al.* are removed by distillation and can, as such, also not be deemed to constitute impurities. The Examiner's position that the combination of references is suited to render applicants' *prima facie* obvious within the meaning of Section 103(a) is, in light of the foregoing reasons, not deemed to be well taken. It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.

The Examiner rejected Claim 4 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Earle et al.* (*ibid.*) when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* (*ibid.*) or the disclosure of *Thiem et al.* (*ibid.*), and the disclosure of *Gerhold* (US 4,402,832).

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40) Final Office action page 6, lines 11 to 18.

The Examiner applied the disclosure of *Gerhold* for stating that a simulated moving bed is a very successful process for separating components from a feed mixture, and asserted that a person of ordinary skill in the art would have, therefore, been motivated to employ a continuous chromatographic process as required in accordance with applicants' Claim 4 for the separations mentioned in the teaching of *Earle et al.*<sup>41)</sup> The respective modification of *Earle et al.*'s process cannot be deemed to result in applicants' invention because the separation procedures which are generally mentioned in the primary reference pertain to a separation of the product and the ionic liquid, or the product and the ionic liquid/acid promoter combination rather than the purification of an ionic liquid from impurities. The combination of references upon which the Examiner relied in this rejection can, therefore, not be deemed to render the subject matter of applicants' Claim 4 *prima facie* obvious within the meaning of Section 103(a). It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.

Additionally, the Examiner rejected Claim 11, 18 and 20 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Earle et al.* (*ibid.*) when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* (*ibid.*) or the disclosure of *Thiem et al.* (*ibid.*), and the disclosure of *Wasserscheid (Ionic Liquids in Synthesis)*.

The Examiner stated in this context:<sup>42)</sup> "*Wasserscheid (...) discloses ... that any volatile compound may be removed from an ionic liquid by distillation. It would have been obvious to evaporate low boiling compounds in Earle (...) alone or further in view of Hackh's Chemical Dictionary ... and either Kawaki (...) or Thiem (...) because Wasserscheid (...) discloses ... that any volatile compound may be removed from an ionic liquid by distillation.*" A person of ordinary skill in the pertinent art following the rationale underlying the Examiner's statement would, however, not have arrived at applicants' purification process. Again, the product obtained in *Earle et al.*'s process cannot be deemed as an impurity because they cannot reasonably be expected to accumulate in the ionic liquid, and/or to impede the oxidation reaction. The by-products which are formed in the context of the oxidation reaction of *Earle et al.* are removed by distillation and can, as such, also not be deemed to constitute impurities.

As such, the teaching of *Earle et al.* when taken in view of *Hackh's Chemical Dictionary*

41) Final Office action page 7, lines 6 to 14.

42) Final Office action page 9, lines 2 to 9.

and either the disclosure of *Kawaki et al.* or the disclosure of *Thiem et al.*, and the disclosure of *Wasserscheid* can also not be deemed to render the subject matter of applicants' Claims 11, 18 and 20 obvious within the meaning of Section 103(a). Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is therefore respectfully solicited.

Moreover, the Examiner rejected Claim 18 and 20 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Earle et al.* (*ibid.*) when taken in view of *Hackh's Chemical Dictionary* and either the disclosure of *Kawaki et al.* (*ibid.*) or the disclosure of *Thiem et al.* (*ibid.*), and the disclosures of *Wasserscheid* (*ibid.*), *Snyder* (*ibid.*) and *Mikes et al.* (*ibid.*), arguing:<sup>43)</sup> "*It would have been obvious that Earle (...) alone or further in view of Hackh's Chemical Dictionary, ... and either Kawaki (...) or Thiem (...), and Wasserscheid (...) uses a resin because Snyder ... discloses ... that ion exchange was the first of the various liquid chromatography methods to be used widely under modern liquid chromatography conditions and Mikes' [sic] ... discloses that synthetic resins are of the greatest importance for ion exchange chromatography.*"

However, as noted in the foregoing, the product obtained in *Earle et al.*'s process cannot be deemed as an impurity because it cannot reasonably be expected to accumulate in the ionic liquid, and/or to impede the oxidation reaction. The by-products which are formed in the context of the oxidation reaction of *Earle et al.* are removed by distillation and can, as such, also not be deemed to constitute impurities. The Examiner's position that the combination of references is suited to render applicants' *prima facie* obvious within the meaning of Section 103(a) is, in light of the foregoing reasons, not deemed to be well taken. It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.

Additionally, the Examiner rejected applicants' Claims 1 to 3, 8 to 11, 13, 17, 18, and 20 to 24 under 35 U.S.C. §103(a) as being unpatentable in light of an alleged concession regarding the background art on page 10, indicated line 39, to page 11, indicated line 39, of the application, when taken in view of the disclosure of *Earle et al.* (*ibid.*), arguing:<sup>44)</sup> "*It would have been obvious to chromatographically separate high-boiling impurities from ionic liquids because ... the specification would appear to concede that the separation of high-boiling impurities from ionic liquids by*

43) Final Office action page 10, lines 6 to 16.

44) Final Office action page 11, lines 3 to 9.

*distillation is well known to be difficult and Earle (...) discloses chromatography, an adsorption process, is a known alternative to distillation for separating ionic liquids."*

However, the referenced sections of *Earle et al.* address the separation of the product and the ionic liquid, or the separation of the product and the ionic liquid/acid promoter combination, and a person of ordinary skill in the pertinent art would not reasonably consider the product of the prior art process as an impurity. As pointed by applicants *inter alia* in the section of the application upon which the Examiner relied:<sup>45)</sup> "*Impurities, in particular high-boiling impurities, accumulate in these recycled streams,*" and also: "*high-boiling components ... frequently impart a color and/or impair the properties of the ionic liquid and/or have other adverse effects.*"

The product of *Earle et al.* is clearly not an impurity, and the information provided in the reference that "*physical or chemical means such as distillation, steam distillation, azeotropic distillation, sublimation, gravity separation, solvent extraction, crystallization, supercritical fluid extraction and chromatography*"<sup>46)</sup> are suitable to separate the product and the ionic liquid, or to separate the product and the ionic liquid/acid promoter combination, can therefore not reasonably be interpreted as a suggestion that the physical or chemical means mentioned by *Earle et al.* are equally suitable for the separation of the ionic liquid and an impurity which accumulates in the ionic liquid and which renders the ionic liquid unsuitable for recycling. It should also be appreciated in this context that applicants' experiments clearly corroborate that the physical and chemical means which are mentioned by *Earle et al.* as suitable for the separation of, e.g., the product and the ionic liquid, are not equally suitable for separating impurities. As shown in the examples described in the application, neither solvent extraction nor distillation achieve a sufficient removal of the impurities.

The Examiner's position that the subject matter of applicants' Claims 1 to 3, 8 to 11, 13, 17, 18, and 20 to 24 was unpatentable in light of the alleged concession when taken in view of the disclosure of *Earle et al.* is, in light of the foregoing, not deemed to be well taken. Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is therefore respectfully solicited.

45) Cf. page 11, indicated lines 4 and 5.

46) Page 1, para. [0008] and page 3, para. [0043], of *US 2004/0015009*.

Further, the Examiner rejected Claims 2, 6, 7, 9, 12, 18 and 20 to 24 under 35 U.S.C. §103(a) as being unpatentable in light of the alleged concession when taken in view of the disclosures of *Earle et al.* (*ibid.*) and of *Snyder* (*ibid.*).

The Examiner, again, applied the disclosure of *Snyder* for stating that ion exchange was the first of various liquid chromatography methods to be used widely under modern conditions, and for disclosing that reversed phase silica gel packings are the closest to a universal system for modern liquid chromatography and that water is usually used as a base solvent,<sup>47)</sup> and argued that a person of ordinary skill in the art would therefore have been motivated to employ ion exchange, with water as a solvent, and reverse phase silica gel in the separation conducted in the purification of an ionic liquid which is contaminated by at least one impurity.<sup>48)</sup>

However, the Examiner's argument is deemed to be in error because the product of *Earle et al.* is not an impurity. A person of ordinary skill in the pertinent art could therefore not reasonably consider the physical and chemical separation methods which are enumerated by *Earle et al.* for the separation of the product and the ionic liquid, or the separation of the product and the ionic liquid/acid promoter combination, as alternative means which are suitable for removing an impurity from a contaminated ionic liquid. In fact, applicants' investigations corroborate that the respective methods are not equivalents when the removal of impurities from a contaminated ionic liquid is sought. As such, the combination of applicants' alleged concession with the disclosures of *Earle et al.* and of *Snyder*, can also not be deemed to render applicants' process obvious within the meaning of Section 103(a). Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is therefore respectfully solicited.

The Examiner rejected Claims 18 and 20 under 35 U.S.C. §103(a) as being unpatentable in light of the alleged concession when taken in view of the disclosures of *Earle et al.* (*ibid.*) and of *Snyder* (*ibid.*) when further taken in view of the disclosure of *Mikes et al.* (*ibid.*).

The Examiner argued:<sup>49)</sup> “*It would have been obvious that that which is conceded to old [sic] ... in view of Earle (...) and Snyder ... uses a resin [sic] because Mikes' [sic] ... discloses that synthetic resins are of the greatest importance for ion exchange chromatography.*” However, as noted in the foregoing, the product of *Earle et al.* is not an impurity, and a person of ordinary skill

47) Final Office action page 11, lines 18 to 21, and page 14, lines 4 to 13.

48) Final Office action page 11, line 21, to page 12, line 5, and page 14, lines 8 to 19.

49) Final Office action page 12, line 19, to page 13, line 3.

in the pertinent art could not reasonably consider the statements of *Earle et al.* regarding the separation of the product and the ionic liquid, or the separation of the product and the ionic liquid/acid promoter combination, as being indicative for means which allow the removal of an impurity from a contaminated ionic liquid. The Examiner's position that the combination of references is suited to render applicants' *prima facie* obvious within the meaning of Section 103(a) is, in light of the foregoing reasons, not deemed to be well taken. It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.

The Examiner rejected Claim 4 under 35 U.S.C. §103(a) as being unpatentable in light of the alleged concession when taken in view of the disclosures of *Earle et al.* (*ibid.*) and of *Gerhold* (*ibid.*).

The Examiner applied the disclosure of *Gerhold* for stating that a simulated moving bed is a very successful process for separating components from a feed mixture, and asserted that a person of ordinary skill in the art would have, therefore, been motivated to employ a continuous chromatographic process as required in accordance with applicants' Claim 4 for the separation of an impurity from an ionic liquid.<sup>50)</sup> The mere fact that *Earle et al.* suggest a variety of means for the separation of the product and the ionic liquid, or the product and the ionic liquid/acid promoter combination can, however, not reasonably be deemed to suggest or imply that the respective means are correspondingly suitable in the purification of an ionic liquid from impurities. Again, applicants' investigations show that such an allegation is without basis. The combination of references upon which the Examiner relied in this rejection can, therefore, not be deemed to render the subject matter of applicants' Claim 4 *prima facie* obvious within the meaning of Section 103(a). It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.

Additionally, the Examiner rejected Claim 11, 18 and 20 under 35 U.S.C. §103(a) as being unpatentable in light of applicants' alleged concession when taken in view of the disclosures of *Earle et al.* (*ibid.*), and of *Wasserscheid* (*ibid.*).

The Examiner stated in this context:<sup>51)</sup> "*Wasserscheid* (...) discloses ... that any volatile compound may be removed from an ionic liquid by distillation. It would have been obvious to evapo-

50) Final Office action page 13, lines 12 to 17.

51) Final Office action page 14, line 22

*rate low boiling compounds in that which is conceded to old [sic] ... in view of Earle (...) because Wasserscheid (...) discloses on page 17, lines 13-15 discloses that any volatile compound may be removed from an ionic liquid by distillation.*" A person of ordinary skill in the pertinent art following the rationale underlying the Examiner's statement would, however, not have arrived at applicants' purification process. Again, the product obtained in *Earle et al.*'s process cannot be deemed as an impurity because they cannot reasonably be expected to accumulate in the ionic liquid, and/or to impede the oxidation reaction, and a person of ordinary skill in the pertinent art could not reasonably consider the statements of *Earle et al.* regarding the separation of the product and the ionic liquid, or the separation of the product and the ionic liquid/acid promoter combination, as being indicative for means which allow the removal of an impurity from a contaminated ionic liquid.

As such, the alleged concession taken in view of the disclosures of *Earle et al.* and of *Wasserscheid* can also not be deemed to render the subject matter of applicants' Claims 11, 18 and 20 obvious within the meaning of Section 103(a). Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is therefore respectfully solicited.

Moreover, the Examiner rejected Claim 18 and 20 under 35 U.S.C. §103(a) as being unpatentable in light of applicants' alleged concession when taken in view of the disclosures of *Earle et al.* (ibid.), of *Wasserscheid* (ibid.), of *Snyder* (ibid.) and of *Mikes et al.* (ibid.), arguing:<sup>52)</sup> "It would have been obvious that that which is conceded to old [sic] ... in view of Earle (...) and Wasserscheid (...) uses a resin [sic] because Snyder ... discloses ... that ion exchange was the first of the various liquid chromatography methods to be used widely under modern liquid chromatography conditions and Mikes' [sic] ... discloses that synthetic resins are of the greatest importance for ion exchange chromatography."

However, as noted in the foregoing, the product obtained in *Earle et al.*'s process cannot be deemed as an impurity because it cannot reasonably be expected to accumulate in the ionic liquid, and/or to impede the oxidation reaction. The by-products which are formed in the context of the oxidation reaction of *Earle et al.* are removed by distillation and can, as such, also not be deemed to constitute impurities. Moreover, a person of ordinary skill in the pertinent art would not reasonably consider the disclosure of means which are suitable to separate, e.g., a product and an ionic liquid, to suggest or imply that these means are equally suitable in the removal of impurities from

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52) Final Office action page 16, lines 1 to 10.

an ionic liquid. The Examiner's position that the combination of references is suited to render applicants' *prima facie* obvious within the meaning of Section 103(a) is, in light of the foregoing reasons, not deemed to be well taken. It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.